

Amendments to the Claims:

The following listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) A method for constructing a composite image of at least a portion of an object based on a plurality of source images, each of the plurality of source images including at least that portion of the object, each of the plurality of source images corresponding to a different focal plane with respect to the object, the method comprising:

determining a first set of pixels of the composite image corresponding to at least one of edges and boundaries in the composite image, wherein the determining includes performing a first type of analysis of the ~~plurality of source images, images~~ at at least some of a plurality of spatial locations in the source images, ~~to determine a first set of pixels of the composite image corresponding to at least one of edges and boundaries in the composite image;~~ and

determining a second set of pixels of the composite image corresponding to surfaces in the composite image, wherein the determining includes performing a second type of analysis of the ~~plurality of source images, images~~ at at least some of the plurality of spatial locations in the source images, ~~to determine a~~ and

at least one of determining the first set of pixels and determining the second set of pixels ~~of the composite image~~ includes at least one operation that suppresses at least some pixels corresponding to ~~surfaces~~ at least partially out-of-focus edges or boundaries in the source images from being included in the composite image.

2. (Original) The method of claim 1, wherein the first set of pixels of the composite image comprises image portions of the composite image corresponding to adequately focused edges or boundaries included in the plurality of source images.

3. (Original) The method of claim 1, wherein the second set of pixels of the composite image comprises image portions of the composite image corresponding to adequately focused surface regions included in the plurality of source images.

4. (Currently Amended) The method of claim 1, wherein:
the first set of pixels of the composite image is determined before the second set of pixels of the composite image is determined; and
the second set of pixels is determined ~~such that~~ at spatial locations outside of the spatial locations corresponding to the first set of pixels, and
~~determining the second set of pixels does not include any of the pixels of the composite image which have been determined to be in the first~~ comprises:
selecting the respective pixels of the second set of pixels based at least partially on an analysis of focus at respective spatial locations in the plurality of source images; and
selecting the respective pixels of the second set of pixels such that a corresponding map of the second set of pixels would include surface region segments of a predetermined minimum size where the source images corresponding to the respective pixels at all of the respective spatial locations included in a surface region segment provide at least one of a limited number of adjacent source image focal planes and a limited distance between the focal planes of the source images.

5. (Currently Amended) The method of claim 4, wherein ~~determining~~
~~the step of selecting the respective pixels of the second set of pixels of the composite image further comprises suppressing image artifacts which correspond to out of focus edges or boundaries included in~~ based at least partially on an analysis of focus may indicate that no source image exhibits satisfactory focus within the at least one of a limited number of adjacent source image focal planes and a limited distance between the plurality

focal planes of the source images at certain spatial locations included in a respective surface region segment, and

the step of selecting the respective pixels of the second set of pixels, such that a corresponding map of the second set of pixels would include surface region segments and selects respective filler pixels of the second set of pixels at those certain spatial locations such that the respective filler pixels correspond to the at least one of a limited number of adjacent source image focal planes and a limited distance between the focal planes of the source images associated with the respective surface region segment.

6. (Currently Amended) The method of claim ~~5~~ 1, wherein ~~suppressing image artifacts which~~ the at least one operation that suppresses at least some pixels corresponding to at least partially out-of-focus edges or boundaries included in the plurality of source images comprises:

determining at least one pixel in the second set of pixels of the composite image that lies at least a prescribed setback distance away from each pixel of the first set of pixels of the composite image, and

subsequently determining at least one pixel in the second set of pixels of the composite image that lies at a distance less than the prescribed setback distance away from at least one pixel of the first set of pixels of the composite image, based at least partially on a characteristic associated with ~~at least one of the~~ at least one pixel in the second set of pixels of the composite image that lies at least the prescribed setback distance away from each pixel of the first set of pixels of the composite image.

7. (Currently Amended) The method of claim 6, wherein:
the at least one pixel in the second set of pixels of the composite image that lies at least the prescribed setback distance away from each pixel of the first set of pixels of the composite image comprises a seed pixel;

the subsequently determined at least one pixel in the second set of pixels that lies at a distance less than the prescribed setback distance away from at least one pixel of the first set of pixels of the composite image is determined based on a grown region including the seed pixel and having extents governed at least partially by the characteristic associated with the at least one pixel in the second set of pixels of the composite image that lies at least the prescribed setback distance away from each pixel of the first set of pixels, and

~~the at least one~~ characteristic associated with the at least one ~~of the at least one~~ pixel in the second set of pixels of the composite image that lies at least the prescribed setback distance away from each of the pixel of the first set of pixels ~~of the composite image~~ comprises at least one of a source image identification, a source image index, and a source image focal plane location.

8. (Original) The method of claim 1, wherein at least one of the first type of analysis and the second type of analysis is based on at least one of grayscale image intensities and color image intensities.

9. (Currently Amended) The method of claim ~~8~~ 1, wherein _____ the first type of analysis comprises a first numerical characterization of the source images at the at least some of the plurality of spatial locations, the first numerical characterization being indicative of source image edge pixels that correspond to at least one of edges and boundaries in the source images and provides a respective indicated degree of focus associated with a respective source image edge pixel, and _____ determining the first set of pixels of the composite image comprises: _____ analyzing the results of the first numerical characterization of the source images at the at least some of the plurality of spatial locations to determine spatial locations where the first numerical characterization results are indicative of at least one source image edge pixel having a satisfactory indicated degree of focus; and

determining the first set of pixels of the composite image at respective spatial locations such that the first set of pixels comprises respective source image edge pixels having a respective indicated degree of focus that is at least one of a satisfactory indicated degree of focus and a best indicated degree of focus available among the source images at the corresponding respective spatial location.

10. (Currently Amended) The method of claim 9, wherein the first numerical characterization comprises at least one of a gradient analysis, a gradient derivative analysis, spatial filtering, and Gaussian spatial filtering.

11. (Currently Amended) The method of claim 9, wherein the at least one operation that suppresses at least some pixels corresponding to at least partially out-of-focus edges or boundaries comprises determining the first set of pixels ~~of the composite image such that it comprises:~~

~~analyzing the results of the numerical characterization of the respective source images at the at least some of the plurality of spatial locations to determine spatial locations where the numerical characterization results are~~ image edge pixels having a satisfactory respective indicated degree of focus; and

~~at each respective spatial location where a numerical characterization result is satisfactory, determining a respective satisfactory source image corresponding to the a satisfactory result; and~~

~~determining at least one pixel of~~ respective indicated degree of focus is a degree of focus that satisfies at least one predetermined numerical criterion for the first set of pixels of the composite image at the respective spatial locations based at least partially on the respective satisfactory source image.

12. (Currently Amended) The method of claim 11, wherein ~~determining the at least one pixel of the first set of pixels of the composite image at the respective spatial~~

~~locations based at least partially on the respective satisfactory source image comprises-~~
~~making the at least one pixel of the first set of pixels of the composite image at the~~ having a
~~respective spatial location the same as the at least one pixel of the~~ indicated degree of focus
~~that is both a satisfactory source image that is spatially congruent with the at least one pixel-~~
~~of the first set of pixels of the composite image~~ indicated degree of focus and a best indicated
degree of focus available among the source images at the corresponding respective spatial
location.

13. (Currently Amended) The method of claim-~~11~~ 9, wherein determining the
first set of pixels of the composite image at respective spatial locations ~~where the numerical-~~
~~characterization results are satisfactory~~ comprises;
_____ determining a preliminary first set of pixels at respective spatial locations-
~~where the numerical characterization results of any of~~ such that the preliminary first set of
pixels comprises respective source image edge pixels having a respective indicated degree of
focus that is at least one of a satisfactory indicated degree of focus and a best indicated
degree of focus available among the source images at that the corresponding respective
spatial location ~~fall within a prescribed range of satisfactory values; and~~
_____ the at least one operation that suppresses at least some pixels corresponding to
at least partially out-of-focus edges or boundaries comprises subsequently refining the
preliminary first set of pixels by eliminating respective pixels that have a respective indicated
degree of focus that is quantitatively poorer than a numerical criterion based on the indicated
degree of focus of its connected neighbors in the preliminary first set.

14. (Currently Amended) The method of claim-~~8~~ 1, wherein the second type of
analysis comprises a second numerical characterization of the source images at the at least
some of the plurality of spatial locations, the second numerical characterization being
indicative of source image surface pixels that correspond to surfaces in the source images and

provides a respective indicated degree of focus associated with a respective source image surface pixel, and

determining the second set of pixels of the composite image comprises:

analyzing the results of the second numerical characterization of the source images at the at least some of the plurality of spatial locations to determine spatial locations where the second numerical characterization results are indicative of at least one source image surface pixel having a satisfactory indicated degree of focus; and

determining the second set of pixels of the composite image at respective spatial locations such that the second set of pixels comprises respective source image surface pixels having a respective indicated degree of focus that is at least one of a satisfactory indicated degree of focus and a best indicated degree of focus available among the source images at the corresponding respective spatial location.

15. (Currently Amended) The method of claim 14, wherein the second numerical characterization comprises at least one of a texture classification analysis, a contrast classification analysis, a texture classification analysis including a variance analysis, and a fractal dimension analysis.

16. (Currently Amended) The method of claim 14, wherein ~~determining the first~~ second set of pixels ~~of the composite image~~ comprises:

~~analyzing the results of the numerical characterization of the source images at the at least some of the plurality of spatial locations to determine spatial locations where the numerical characterization results are satisfactory;~~

~~determining, at each respective spatial location where a numerical characterization result is satisfactory, a respective satisfactory source image corresponding to the satisfactory result; and~~

~~_____determining at least one pixel of the second set of pixels of the composite image at the respective spatial locations based at least partially on the respective source image surface pixels having a satisfactory source image respective indicated degree of focus, and a satisfactory respective indicated degree of focus is a degree of focus that satisfies at least one predetermined numerical criterion for the second set of pixels.~~

17. (Currently Amended) The method of claim 16, wherein ~~determining the at least one pixel of the second set of pixels of the composite image at the respective spatial locations based at least partially on the respective satisfactory source image~~ comprises ~~making the at least one pixel of the second set of pixels of the composite image at the~~ having a respective spatial location the same as the at least one pixel indicated degree of focus is both a satisfactory indicated degree of focus and a best indicated degree of focus available among the satisfactory source image that is spatially congruent with the at least one pixel of the second set of pixels of the composite image images at the corresponding respective spatial location.

18. (Cancelled)

19. (Cancelled)

20. (Currently Amended) A recording medium that stores a control program, the control program executable on a computing device, the computing device couplable to a vision system, the control program including instructions for constructing an adequately focused composite image of at least a portion of an object based on a plurality of source images of at least that portion of the object, the plurality of source images corresponding to a plurality of focal planes with respect to the object, the instructions comprising:

~~_____instructions for analyzing the source images at a plurality of spatial locations in the source images with a first analysis technique that is sensitive to focus and at least one boundary property;~~

~~instructions for determining a first set of pixels of the composite image based on the results of the first analysis technique corresponding to at least one of edges and boundaries in the composite image, wherein the determining includes performing a first type of analysis of the plurality of source images, images at at least some of a plurality of spatial locations in the source images, to determine a first set of pixels of the composite image corresponding to at least one of edges and boundaries in the composite image;~~

~~instructions for analyzing the source images at a plurality of spatial locations in the source images with a second analysis technique that is sensitive to focus and at least one surface property; and~~

~~instructions for determining a second set of pixels of the composite image outside of the first set of pixels based on the results of the second analysis technique corresponding to surfaces in the composite image, wherein~~

~~the determining includes performing a second type of analysis of the plurality of source images, images at at least some of the plurality of spatial locations in the source images, and~~

~~at least one of determining the first set of pixels and determining the second set of pixels of the composite image includes at least one operation that suppresses at least some pixels corresponding to surfaces at least partially out-of-focus edges or boundaries in the source images from being included in the composite image.~~

21. (Currently Amended) A carrier wave encoded to transmit a control program to a device for executing the control program, the device couplable to a vision system, the control program including instructions for constructing an adequately focused composite image of at least a portion of an object based on a plurality of source images of at least that portion of the object, the plurality of source images corresponding to a plurality of focal planes with respect to the object, the instructions comprising:

~~instructions for analyzing the source images at a plurality of spatial locations in the source images with a first analysis technique that is sensitive to focus and at least one boundary property;~~

~~instructions for determining a first set of pixels of the composite image based on the results of the first analysis technique~~ corresponding to at least one of edges and boundaries in the composite image, wherein the determining includes performing a first type of analysis of the plurality of source images, images at at least some of a plurality of spatial locations in the source images, to determine a first set of pixels of the composite image corresponding to at least one of edges and boundaries in the composite image;

~~instructions for analyzing the source images at a plurality of spatial locations in the source images with a second analysis technique that is sensitive to focus and at least one surface property; and~~

~~instructions for determining a second set of pixels of the composite image outside of the first set of pixels based on the results of the second analysis technique~~ corresponding to surfaces in the composite image, wherein

~~the determining includes performing a second type of analysis of the plurality of source images, images at at least some of the plurality of spatial locations in the source images, and~~

~~at least one of determining the first set of pixels and determining the second set of pixels of the composite image includes at least one operation that suppresses at least some pixels corresponding to surfaces at least partially out-of-focus edges or boundaries in the source images from being included in the composite image.~~

22. (Currently Amended) A vision system comprising an imaging system, a vision system controller, a memory portion, and a composite image processor operable to construct an adequately focused composite image of at least a portion of an object based on a

plurality of source images of at least that portion of the object, the plurality of source images corresponding to a plurality of focal planes with respect to the object, the composite image processor comprising:

an edge processing portion that performs a first type of analysis of the plurality of source images, at at least some of a plurality of spatial locations in the source images, to determine a first set of pixels of the composite image corresponding to at least one of edges and boundaries in the composite image; and

a surface processing portion that performs a second type of analysis of the source images, at at least some of the plurality of spatial locations in the plurality of source images, to determine a second set of pixels of the composite image corresponding to surfaces in the composite image, the surface processing portion suppressing image artifacts which correspond to out-of-focus edges or boundaries included in the plurality of source images.

23. (Original) The vision system of claim 22, wherein:

the edge processing portion comprises:

a source image edge processing portion usable to provide a first characterization of the source images at the at least some of the plurality of spatial locations, the first characterization usable to indicate adequately focused edges or boundaries included in the source images, and

a composite image edge determining portion that determines the first set of pixels of the composite image based on the first characterization provided by the source image edge processing portion; and

the surface processing portion comprises:

a source image surface processing portion usable to provide a second characterization of the source images at the at least some of the plurality of spatial locations,

the second characterization usable to indicate adequately focused surface regions included in the source images; and

a composite image surface determining portion for determining the second set of pixels of the composite image based on the second characterization provided by the source image surface processing portion.

24. (Original) The vision system of claim 22, wherein;

the edge processing portion determines the first set of pixels of the composite image before the surface processing portion determines the second set of pixels of the composite image; and

the surface processing portion determines the second set of pixels such that the second set of pixels does not include any of the pixels of the composite image which have been determined to be in the first set of pixels.

25. (Original) The vision system of claim 22, wherein, when the composite image processor determines the second set of pixels of the composite image, the composite image processor suppresses image artifacts which correspond to out-of-focus edges or boundaries included in the plurality of source images.

26. (Original) The vision system of claim 22, wherein the composite image processor is part of a general computerized control system of the vision system.

27. (Original) The vision system of claim 26, wherein the general computerized control system further comprising a control instruction generation system operable to generate at least one of a part program instruction, an inspection program control instruction, and a composite image processor control instruction, the generated instruction usable to operate the composite image processor to construct a desired representation of a composite image.